



ARCTIC OBSERVING MISSION

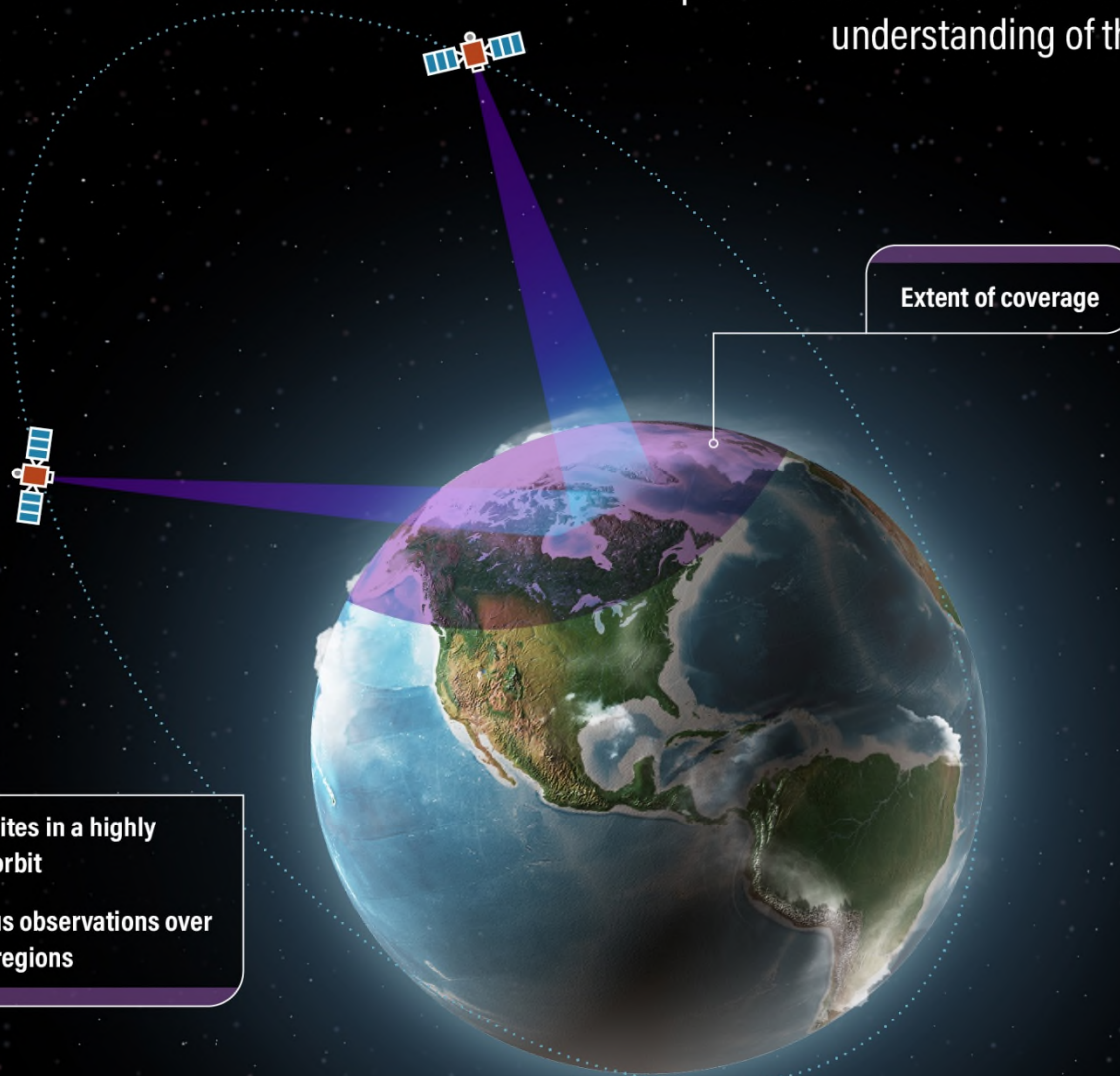
Proposed Canadian-led international satellite mission to provide a better understanding of the effects of climate change in the North

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Environment and
Climate Change
Canada
(ECCC)

CEOS AC-VC

2023
October 25



METEOROLOGY

Support weather and environmental predictions for the North



GREENHOUSE GASES

Detect and monitor greenhouse gas emissions from natural and human activity



AIR QUALITY

Monitor air pollutant emissions and improve air quality forecasts



SPACE WEATHER

Improve space weather forecasts and protect satellites and ground-based infrastructures



Canadian Space Agency / Agence spatiale canadienne

In Pre-Formulation Study. If funded, launch ~2034 for 10-year mission



AOM Status, Timeline and Partnerships

2022-2025 (Pre-formulation Studies – Phase 0)

- GHG instrument sub-orbital demonstration stratospheric balloon flight: August 2022
- NOAA-funded meteorological imager adaptation study with L3Harris: Completed December 2022
- AOM CO₂/NO₂ science study (Univ. of Toronto): Started January 2023, planned completion mid-2024
- Socio-economic benefits study (EuroConsult): Completed June 2023
- GHG observing strategy manuscript: Submitted June 2023, accepted October 2023
- AOM Mission Design Contract (MDA, ABB, Airbus): Started June 2023, planned completion fall 2024
- GHG instrument Focal Plane Array (FPA) technology development study: Start fall 2023, ending fall 2024
- Various other science/application studies (AOM OSSE, orbit studies,) in progress
- Possible funding request in 2025, decision ~2026

2026-2034 (Phases A-D)

- If approved, detailed design, build and launch

2034-2044 (Phase E)

- AOM operations (10-year mission)

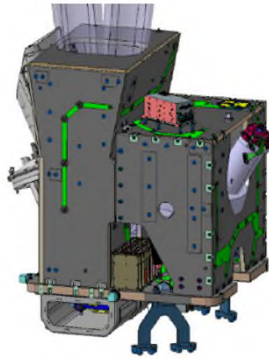
- Envision a Canadian-led international mission, where international partnership is essential to secure Canadian funding and overall success
- Discussions with NOAA, NASA & EUMETSAT are progressing on potential contributions
- We welcome further contributions from other international space/meteorological agencies



Proposed Arctic Observing Mission (AOM) Payloads

UV-Vis Air Quality Spectrometer

~100 kg



Meteorological Imager



Advanced Baseline Imager (ABI)

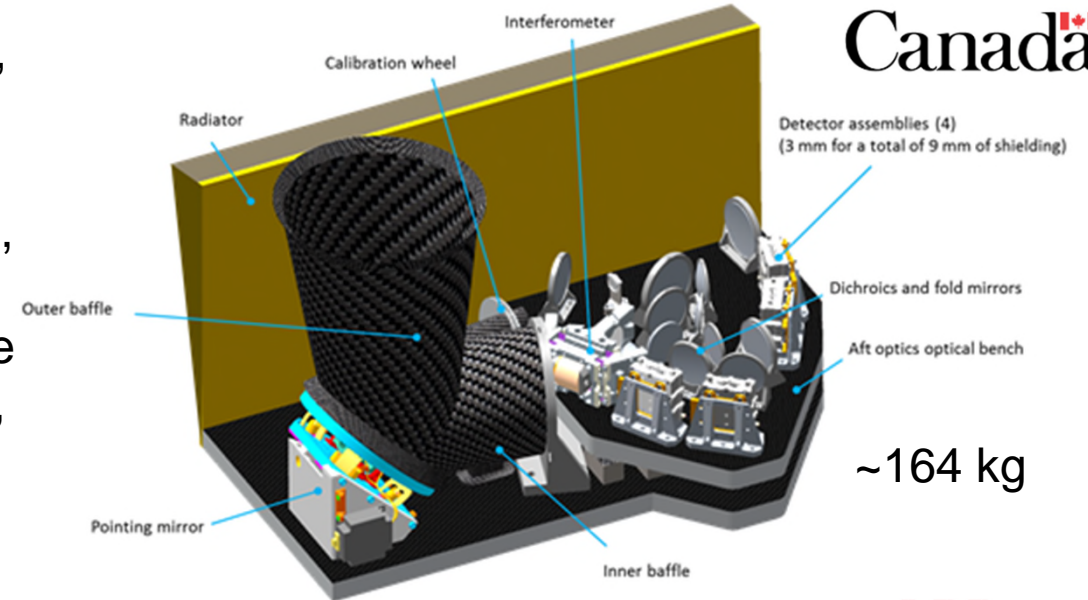
NOAA spare expected to be contributed to AOM

~350 kg

NIR-SWIR GHG Imaging Fourier Transform Spectrometer (IFTS)

Bands: 0.76, 1.6, 2.1, 2.34 μm .

Hourly $\sim 4 \times 4 \text{ km}^2$ CO_2 , CH_4 , CO and Solar Induced Fluorescence (SIF) over cloud-free, Arctic & Boreal land during daylight.



Canada

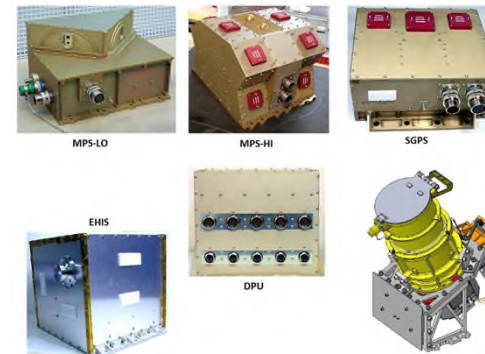
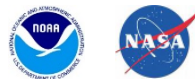
~164 kg

ABB

Interferometer technology of ACE-FTS, GOSAT & CrIS instruments

Space weather instrument suite

~95 kg

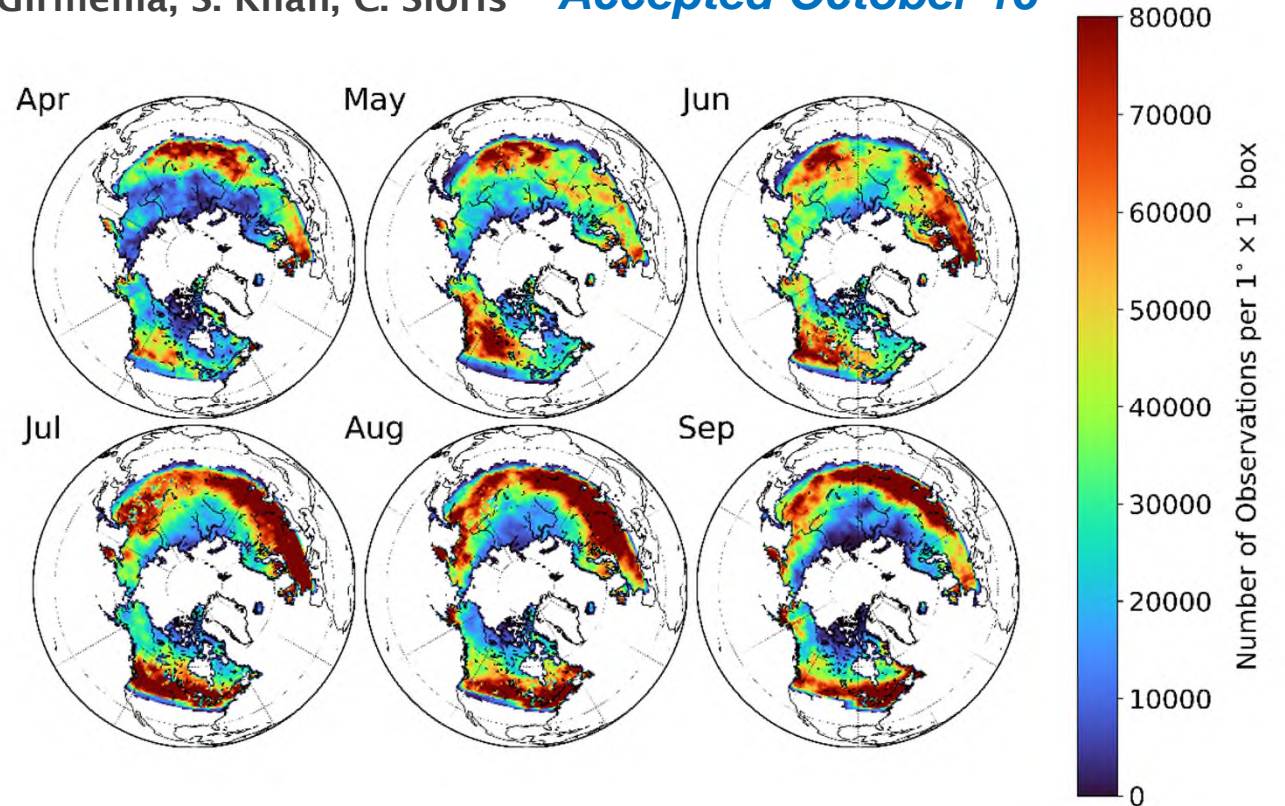
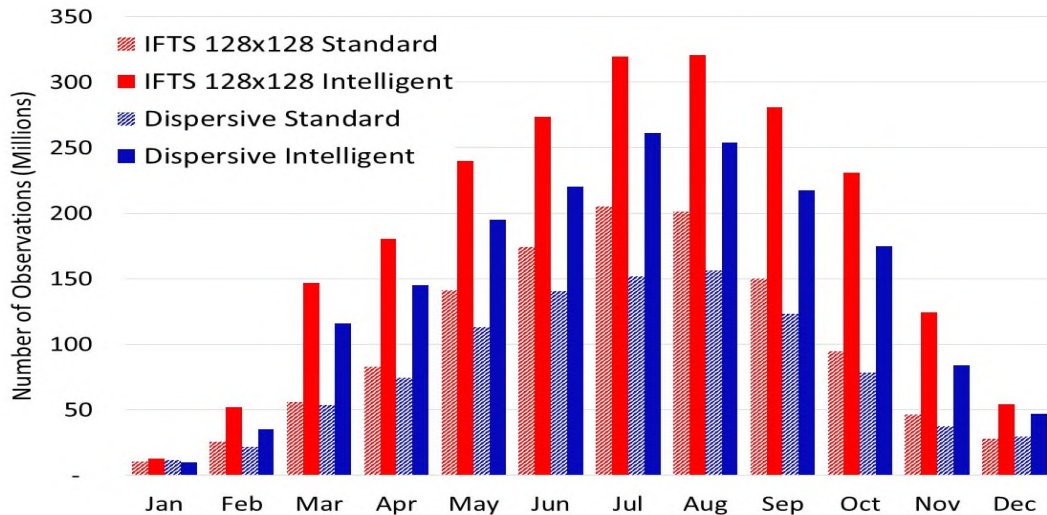
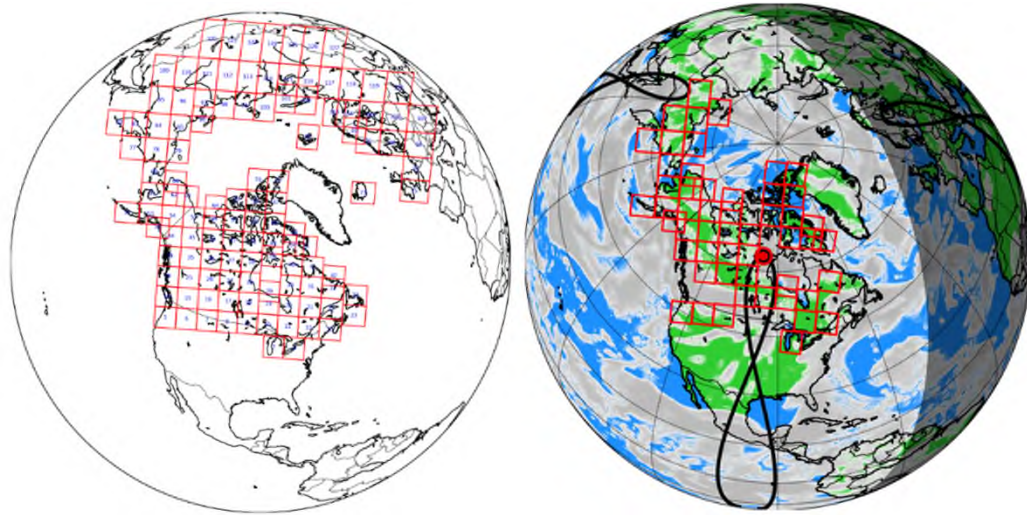


EUMETSAT

Potential contributions in data reception & data processing

Intelligent Pointing increases the fraction of cloud-free CO₂ and CH₄ observations from space

R. Nassar, C.G. MacDonald, B. Kuwahara, A. Fogal, J. Issa, A. Girmenia, S. Khan, C. Sioris *Accepted October 16*



- Typically ~70% of Earth is covered by clouds
- *Intelligent Pointing* pioneered by GOSAT-2, but simulations suggest it is even more effective from HEO and GEO than LEO
- With real-time cloud information, 128x128 pixel Field-of-View (FOV) pointed at 54 best locations per hour, resulting in hourly revisit during daylight for cloud-free land areas north of 45°N for most of the year